REMARKS

Applicants amend claims 1 and 12, and add new claims 14-19, as shown on the attached sheets. In addition to a clean copy of all the claims now pending in the application, a marked-up copy of the amended claims in which additions are underlined and deletions are bracketed is also enclosed. Support for the amendments and the new claims can be found throughout the specification, and more particularly, on page 5, lines 21-28, page 6, line 24 to page 7, line 12. Thus, no new matter is added. As discussed in detail below, the claimed invention distinguishes patentably over the cited art.

Rejection Under 35 U.S.C. 102(e)

The Office Action rejects claims 1-5 and 8-13 as being anticipated by U.S. Patent No. 6,313,014 of Sakaguchi et al.

The present invention relates generally to methods and systems for SIMOX wafer processing of a silicon substrate that inhibit formations of threading dislocations in the top silicon layer. More particularly, as recited in amended claim 1, a method of the invention can include the steps of evacuating a vacuum chamber in which the substrate is placed to a first pressure, introducing a fluid other than molecular oxygen into the vacuum chamber, and implanting ions into the substrate to form a buried oxide layer under a top silicon layer, wherein the fluid inhibits formations of threading dislocations in the top silicon layer.

Sakaguchi, which relates to a method of manufacturing an SOI substrate, fails to teach introducing a fluid other than molecular oxygen into a vacuum chamber, in which a substrate is placed, during or before implanting ions into the substrate *while the fluid is present in the chamber*. In fact, Sakaguchi describes preparing a hydrogen-annealed single-crystal silicon substrate by heat-treating a silicon substrate in a reducing atmosphere containing hydrogen, and in a *separate step*, forming an ion-implantation layer in the hydrogen-annealed substrate by oxygen implantation. That is, in Sakaguchi, the silicon substrate is heat-treated in a reducing atmosphere *before* an oxygen ion implantation step. See, for example, Sakaguchi at col. 5, lines

38-42. There is no teaching or suggestion in Sakaguchi that the reducing atmosphere is present in the vacuum chamber while the ion-implantation layer is formed.

In contrast, claim 1 recites introducing a fluid other than molecular oxygen into the vacuum chamber before or during implanting ions in the substrate. Thus, claim 1 distinguishes patentably over the Sakaguchi patent. Claims 2- 5 and 8-11 depend either directly or indirectly on claim 1, and hence are also patentable.

Claim 12 is an independent claim that recites a method of processing a substrate by placing it in a vacuum chamber that has been evacuated to a selected pressure and into which a fluid has been introduced. Subsequently, ions are implanted into the substrate to form a buried oxide layer under a top silicon layer. Further, a decrease in the ion beam current level, due to the fluid in the chamber is measured, and the fluid level is adjusted based upon this meausrement.

As discussed above, Sakaguchi does not teach or suggest introducing a fluid in a vacuum chamber before or during ion implantation of a substrate placed in the chamber. Consequently, there is no teaching or suggestion in Sakaguchi regarding measuring a decrease in the ion beam current due to the fluid introduced into the chamber, and adjusting the fluid level based on such a measurement. Thus, Sakaguchi fails to teach or suggest material features of claim 12, and hence does not anticipate this claim, or claim 13 which depends on claim 12.

Rejections Under 35 U.S.C. 103

The Office Action rejects claims 6 and 7 as being obvious in view of the Sakaguchi patent.

Claims 6 and 7 depend on claim 1 and recite values for the pressure in the vacuum chamber before and after introducing fluid into the chamber.

As discussed above, Sakaguchi fails to teach or suggest introducing a fluid into the vacuum chamber before or during implanting ions into the substrate while the fluid is present in

the chamber. Thus, Sakaguchi fails to teach or suggest material features of claim 1, and consequently fails to suggest the subject matter of claims 6 and 7, which depend on claim 1.

The New System Claims Distinguish Over Sakaguchi

Independent claim 14 recites a system for processing SIMOX wafers that includes, in addition to an ion source coupled to an evacuated chamber having a wafer holder, a fluid valve for introducing a fluid into the chamber and a feedback control system that can adjust the valve to regulate the flow of fluid into the chamber.

Sakaguchi does not teach or suggest a system for SIMOX processing that includes a feedback system for adjusting the flow of a fluid to an evacuated chamber of an ion implantation system based on one or more measured parameters. In fact, as discussed in detail above, Sakaguchi does not teach or suggest introducing a fluid into a vacuum chamber of an ion implantation system before or during ion implantation of a substrate.

Thus, claim 14, and claims 15-19 dependent thereon, distinguish patentably over Sakaguchi.

CONCLUSION

In view of the above amendments and remarks, the application is in condition for allowance. Hence, reconsideration and allowance of the application are respectfully requested. If there are any remaining issues, Applicants invite the Examiner to call undersigned at (617) 439-2514.

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Respectfully submitted,

By _____

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Copy of Amended Claims With Revisions Marked

1. (Amended) A method of processing a silicon substrate, comprising:

[placing the substrate into a vacuum chamber;]

evacuating [the] a vacuum chamber in which the substrate is placed to a first pressure;

introducing a fluid other than molecular oxygen into the vacuum chamber; and

implanting ions into the substrate to form a buried oxide layer under a top silicon layer, wherein the fluid inhibits formations of threading dislocations in the top silicon layer for reducing a defect density of the processed substrate.

12. (Amended) A method of processing a substrate, comprising:

[placing the substrate into a vacuum chamber;]

evacuating a [the] vacuum chamber in which the substrate is placed to a first pressure;

introducing a fluid into the vacuum chamber; [and]

implanting ions into the substrate using an ion beam to form a buried oxide layer under a top silicon layer;

measuring a decrease in the ion beam current level due to the fluid in the chamber; and

adjusting the fluid level based upon the measured ion beam current level.